Operation Manual
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Daniel™ Split Clamp Extractor Tool

for SeniorSonic™ 4-Path Gas Ultrasonic Flow Meters

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EMERSON.
Process Management

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Signal words and symbols used in this manual

Pay special attention to the following signal words, safety alert symbols and statements:

Safety alert symbol

This is a safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Notice is used to address safety messages or practices not related to personal injury.

Important

Important is a statement the user needs to know and consider.

Tip

Tip provides information or suggestions for improved efficiency or best results.

Note

Note is “general by-the-way” content not essential to the main flow of information.

Important safety instructions

Daniel Measurement and Control, Inc. (Daniel) designs, manufactures and tests products to function within specific conditions. Because these products are sophisticated technical instruments, it is important that the owner and operation personnel strictly adhere both to the information printed on the product nameplate and to all instructions provided in this manual prior to installation, operation, and maintenance.

Daniel also urges you to integrate this manual into your training and safety program.

BE SURE ALL PERSONNEL READ AND FOLLOW THE INSTRUCTIONS IN THIS MANUAL AND ALL NOTICES AND PRODUCT WARNINGS.

⚠WARNING

Failure to follow the installation, operation or maintenance instructions for a Daniel product could lead to serious injury or death.

- Comply with all information on the product, in this manual, and in any local and national codes that apply to the product.
- Do not allow untrained personnel to work with this product.
- Use Daniel parts and work procedures specified in this manual.

Product owners (Purchasers):

- Use the correct product for the environment and pressures present. See technical data or product specifications for limitations. If you are unsure, discuss your needs with your Daniel representative.
- Inform and train all personnel in the proper installation, operation, and maintenance of this product.
- To ensure safe and proper performance, only informed and trained personnel should install, operate, repair and maintain this product.
- Verify that this is the correct instruction manual for your Daniel product. If this is not the correct documentation, contact Daniel at 1-713-827-6314. You may also download the correct manual from:

  http://www.daniel.com

- Save this instruction manual for future reference.
- If you resell or transfer this product, it is your responsibility to forward this instruction manual along with the product to the new owner or transferee.
- ALWAYS READ AND FOLLOW THE INSTALLATION, OPERATIONS, MAINTENANCE AND TROUBLESHOOTING MANUAL(S) AND ALL PRODUCT WARNINGS AND INSTRUCTIONS.
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- To prevent personal injury, personnel must follow all instructions of this manual prior to and during operation of the product.
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- Read and understand all instructions and operating procedures for this product.
- If you do not understand an instruction, or do not feel comfortable following the instructions, contact your Daniel representative for clarification or assistance.
- Install this product as specified in the INSTALLATION section of this manual per applicable local and national codes.
- Follow all instructions during the installation, operation, and maintenance of this product.
- Connect the product to the proper pressure sources when and where applicable.
- Ensure that all connections to pressure and electrical sources are secure prior to and during equipment operation.
- Use only replacement parts specified by Daniel. Unauthorized parts and procedures can affect this product's performance, safety, and invalidate the warranty. “Look-a-like” substitutions may result in deadly fire, explosion, release of toxic substances or improper operation.
- Save this instruction manual for future reference.

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Section 1: Introduction

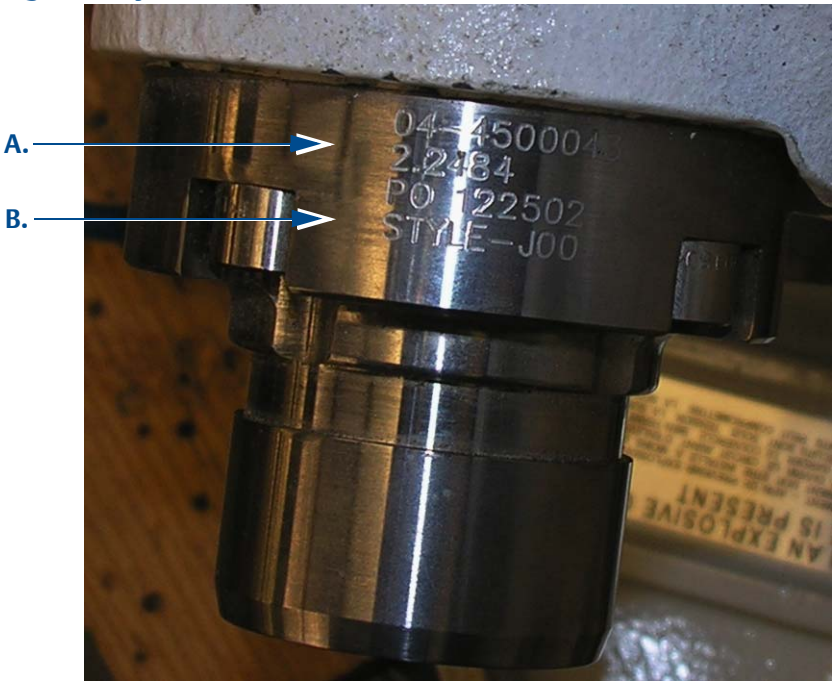
1.1 Overview

The Daniel Ultrasonic Split Clamp Extractor Tool is designed for use on Daniel SeniorSonic™ 4 Path Gas Ultrasonic Meters only. The Daniel Ultrasonic Split Clamp Extractor Tool Operation Manual (P/N 3-9000-744) provides operating instructions for 4 Path meters fitted with T- Slot design transducer mounts (see Figure 1-2). The following mounts are included:

- 150 ANSI to 600 ANSI Ultrasonic meters with style J mounts (example J00, J25, J50 and J75)
- 900 ANSI and 1500 ANSI Ultrasonic meters with style K mounts (example K00, K25, K50, and K75)

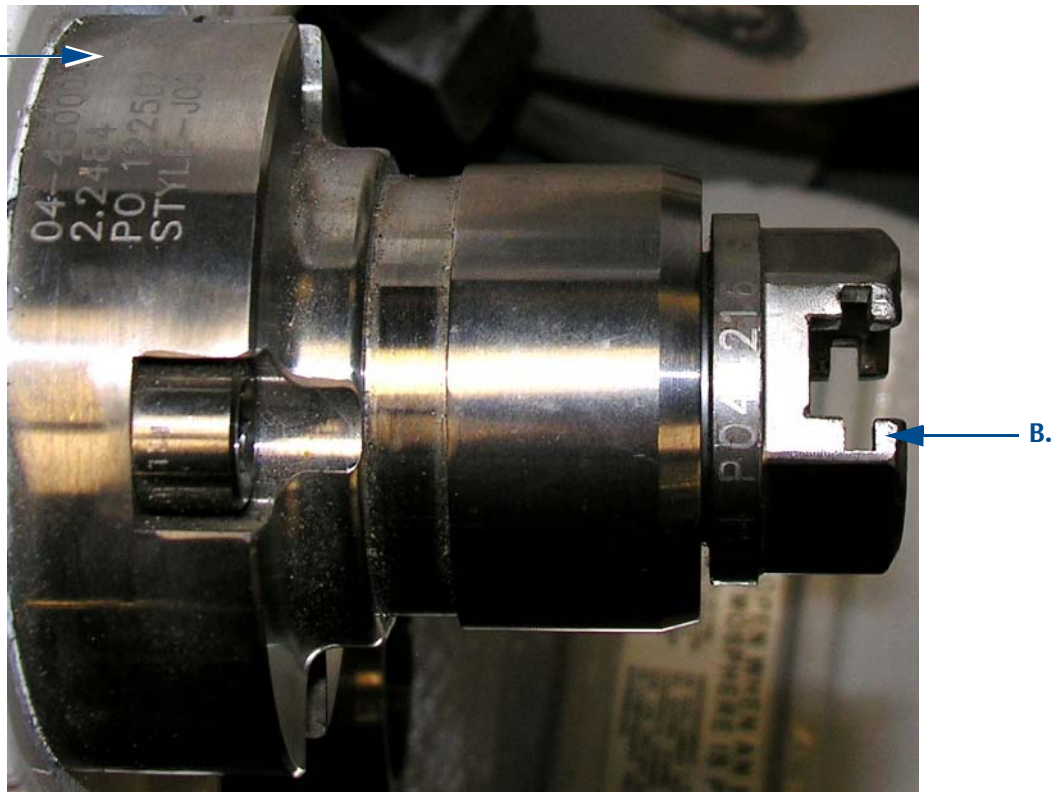
All transducer mounts and holders are stamped, identifying the mount length, mount style, serial number, and purchase order information (see Figure 1-1 and) Figure 1-2).

Figure 1-1 J-mount transducer identification



A. Mount length identifier
B. Mount style identifier

Figure 1-2 J-mount transducer identification



A. Mount identification (serial number, length, purchase order number and style)
B. T-slot transducer holder

Daniel Ultrasonic meters with M-mount (150 ANSI to 600 ANSI) or P-mount (900 ANSI to 1500 ANSI) T- slot transducer holders are not designed for the Split Clamp Extractor Tool and this manual does not apply to these mount styles. M-mount and P-mount bodies are threaded to accept extractor tool coupling and will not accept split clamp extractor tool (see Figure 1-3). Refer to the *Daniel Ultrasonic Extractor Tool Operation Manual*, Daniel P/N 3-9000-729 for threaded body types.

Figure 1-3 M-mount transducer identification

A. Mount identification (serial number, length, purchase order number and style)
B. Threaded mount

Important:

The ultrasonic extractor tool requires a valve with an NPT female threaded port as a pressure point for the line pressure. This valve must be installed within six inches of the ultrasonic meter pressure tap hole provided on the ultrasonic meter housing.

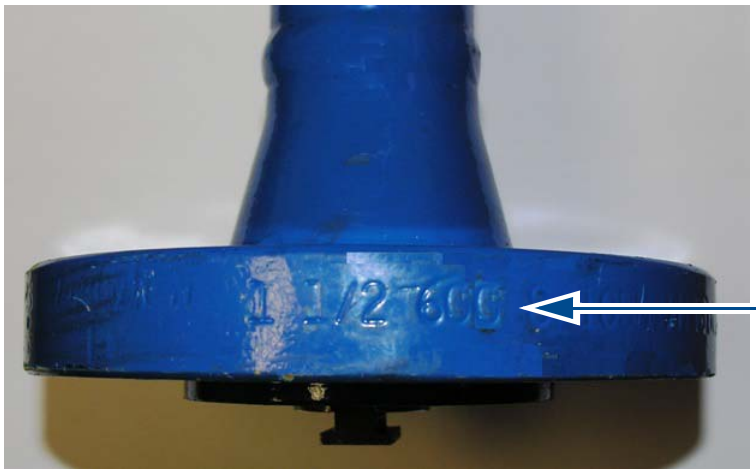
For ANSI #300 and #600 meters, use a valve with a ¼"or ½" NPT female threaded port. The ¼" reducer provided in the tool kit must be used with the ½" NPT female threaded port.

For ANSI #900 and #1500 meters, use a valve with a 3/8 "or ½" NPT female threaded port. The 3/8 "reducer provided in the tool kit must be used with the ½"NPT female threaded port.

1.2 Extractor tool specifications

The Daniel Extractor Tool is available in two ANSI pressure ratings, 600 and 1500. The pressure rating is stamped on the Lubricator chamber assembly flange (item M, drawing D-08248). See Appendix C and Figure 1-4.

Figure 1-4 ANSI Class pressure rating stamp on lubricator chamber assembly flange



A. ANSI Class pressure rating identification location

⚠WARNING

EXTRACTOR TOOL HANDLING HAZARD

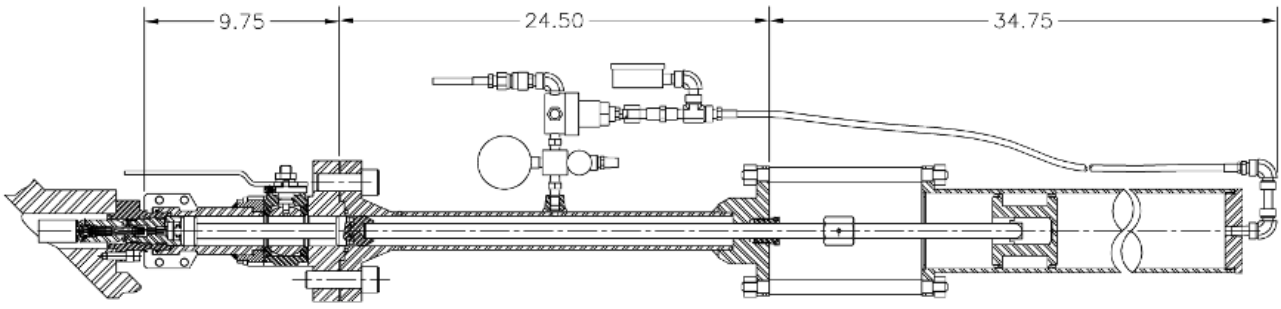
The extractor tool, when it is fully assembled is heavy (144-160 lbs), long (6 ft) and may be difficult to operate in tight quarters. Take care not to lean on, sit on, or step on the unit.

Failure to follow the handling instructions may cause the tool to fall and cause serious personal injury.

Table 1-1 Daniel extractor tool specifications

Extractor tool weight by disassembled component	**Weight (lbs),**	
	ANSI 600	**ANSI 1500**
Suitcase	52	52
Extractor tool valve assembly (Split clamp)	24	30
Lubricator chamber assembly	32	42
Extractor tool piston assembly	15	15
2 hoses (one black and one stainless steel)	4	4
Tool kit	17	17
Extractor tool total weight	144	160
Extractor tool length and operating temperature	**Length and operating temperature range**	
Tool length	(see Figure 1-5)	
Operating temperature	- 4 °F to 212 °F (-20 °C to 100 °C)	

Figure 1-5 Split clamp extractor tool assembly dimensions (inches)



⚠ DANGER

HAZARDOUS MATERIALS

Do not use the Daniel Extractor Tool in environments with hydrogen sulfide present. The tool is not designed for use in these environments.

Failure to follow these instructions will cause death from asphyxiation, fire, or explosion.

1.3 Extractor tool pre-use and post-use inspection

Prior to and after using the extractor tool, the following inspection procedure must be followed:

Refer to drawing D-08248 Detail D (see Appendix C).

1. Prior to connecting the Lubricator Chamber Assembly to the Piston Assembly verify the extractor rod (N) on the Lubricator Chamber Assembly is correctly indicating by performing the following steps.
    a. Make sure the extractor rod is clean and free of dirt and it smoothly pulls in and out of the Lubricator Chamber Assembly.
    b. Grasp the extractor rod (N) and gently pull it out until it stops.
    c. The scribe mark at the end of extractor rod (N) is clearly visible.
2. Visually verify that all hoses are intact with no kinks or tears.
3. Visually inspect the four bolts that hold the Piston Assembly onto the Lubricator Chamber Assembly. Make sure they are clean and that the threads are not galled, stripped or damaged.
4. Make sure that there are at least eight (8) backup O-Rings and enough lubricant to replace all transducer holders extracted. If not enough, order enough for current and future use. See Daniel Service Group for O-Ring part numbers.
5. Perform a bench test to verify the pressure gauge and regulator on the Lubricator Chamber Assembly are working properly. Follow Section 4.1, Step 1C to Step 6A in this manual to prepare the Extractor tool for the bench test.
    a. Close the Extractor Tool Valve (H) and use 300 psi nitrogen pressure to pressurize the extractor tool.
    b. Visually verify that there are no leaks at the NPT thread connections. Use Snoop® or soapy water solution for this visual leak check.
    c. Confirm that the Lubricator Chamber Assembly line pressure gauge (T) is indicating the correct line pressure. Adjust the regulator (V) to the required piston pressure (see pressure references Table A-1 Appendix A). Verify that the Piston Assembly gauge (U) indicates according to Table A-1.
    d. Check all Joints including ball seal for leaks using Snoop or a soapy water solution. Turn the line pressure valve off. Use the Lubricator Chamber vent valve (R), and bleed the line pressure from the tool. Confirm that both gauges show a slow decrease in pressure until zero pressure is reached.
    e. Close the vent valve (R).

6. Use USM Extractor Tool pre-use and post-use Inspection checklist (see Appendix B) to log the inspection and to report any issues found.

7. All technicians who use the extractor tool must take and successfully pass the Daniel Extractor Tool course prior to using this tool. Technicians who do not pass the Daniel Extractor course must not use the extractor tool until they repeat and pass the course. The service manager must verify that the technicians are trained and have successfully passed the Daniel Extractor Tool course before operating the extractor tool.

8. The Daniel Extractor Tool course must be retaken every two years to ensure safe use of the tool. The service manager must verify that all technicians operating the extractor tool retake the Daniel Extractor Tool course once every two years.

Section 2: Operation preparation and part replacement notes

2.1 Operation preparation

1. These instructions refer to details and symbols identified on Daniel Measurement and Control drawing D-08248 (see Appendix C). This operation instruction procedure applies to T-slot design transducer mount assemblies on Daniel SeniorSonic™ ultrasonic meters only using an extractor tool. The extractor tool uses line pressure to extract the transducer assembly (J).
2. If line pressure is vented from the meter, the transducer can be removed without using the extractor tool. See the Daniel Ultrasonic Gas Flow Meter Reference, Installation and Operation Manual 3-9000-743, for T-slot transducer assembly (J) replacement with line pressure vented.
3. Always use protective equipment. Proper protective equipment in accordance with the customer's regulations and site standard operating procedures is required prior to operation of the extractor tool. A thorough job safety analysis should be done for all procedures. Protective equipment may include the following:
   - eyewear
   - footwear
   - hearing protection
   - gloves
   - hard hat

Important safety information

⚠WARNING

SURFACE TEMPERATURE HAZARD

Meter body and piping may be extremely hot or cold. Wear personal protective equipment when coming in contact with the meter.

Failure to do so may result in injury.

⚠WARNING

EQUIPMENT HANDLING AND LIFTING HAZARD

Extractor tool weight and length and the varying pipeline height requires two service technicians to safely handle and install the equipment.

Pipeline installations may be higher or lower than waist level or in confined spaces. Proper scaffolding, provided by the customer, is required to position the technicians at waist level with extractor tool.

Failure to use recommended number of personnel when installing, handling, lifting, bending and twisting could cause the tool to become unstable or dropped and result in injury to personnel or cause damage to the equipment.

⚠CAUTION

NOISE HAZARD - HEARING LOSS

Uncontrolled release of pressurized product may cause hearing discomfort. Wear proper ear protection when operating the extractor tool.

Failure to do so can result in injury.

⚠WARNING

CUTTING OR CRUSHING HAZARD

Do not permanently attach any tool (e.g., a ratchet) to the extractor tool. High line pressure increases the velocity of moving parts which may cut or crush extremities.

Failure to keep extremities clear of the moving parts (e.g., pistons or piston rod) may cause injury to personnel.

4. Oral communication must be established prior to depressurizing the line, if required.

⚠WARNING

NOISE HAZARD - ORAL COMMUNICATION

Release of pressurized product makes communication with operators and service technicians difficult.

Operators must develop a method of communication prior to using the extractor tool. Failure to do so can result in injury.

5. Enough lighting to see the gauge is required prior to extractor tool usage.
6. Allow at least eight (8) feet of clearance to assemble and install the extractor tool.

⚠CAUTION

TRIPPING HAZARD

Clear all obstacles or obstructions from the work area when transporting, handling, installing or removing the extractor tool.

Failure to keep work areas clear of obstacles and obstructions could result in injury or equipment damage.

2.2 Part replacement notes

1. The following instructions are for removal and installation of one transducer assembly (J). Repeat the following steps for each transducer assembly removal or installation
2. For accurate operation, do not exchange any transducer assembly part or parts from the meter chord path designated by the Daniel manufacturing facility. See notes 4, 5 and 6 below for further instruction.
3. Transducer assemblies (J) in good working condition can be removed, cleaned and reinstalled.
4. When a transducer assembly (J) is replaced, it is necessary for accurate operation to modify the calibration parameters for the chord in which the transducer assembly exchange occurred. This means modifying the ultrasonic meter electronics Modbus registers for "L", Average Delay Time and Delta Delay Time for the affected chord.
5. Transducer assemblies (J) are always replaced in pairs on any given chord path. The Average Delay Time and Delta Delay Time are included on a Calibration Sheet provided with each transducer assembly (J) pair. The length of each transducer assembly (J) is also provided on the Calibration Sheet, as well as, etched on the transducer assembly external surface. See Note 7and Note 8 below for further instructions.
6. When a transducer stalk assembly (D) and/or transducer holder (K) is replaced, it is necessary for accurate operation to modify the calibration parameters for the chord in which the transducer parts exchange occurred. This means modifying the ultrasonic meter electronics Modbus[1] registers for "L" for the affected chord. The length of each transducer stalk assembly (D) and transducer holder (K) is etched on the part's exterior surface. See Note 7 and Note 8 below for further instructions.
7. The value "L" is determined by adding the length of the meter housing chord to the lengths of the transducer mounts (E) and subtracting the lengths of the transducer assemblies (J), transducer stalk assemblies (D) [if fitted] and transducer holders (K). The length of the meter housing chord paths and transducer mounts (E) are given on the original calibration sheet provided with the ultrasonic meter. The length of each transducer mount (E) is marked on the rim of the part.
8. Transducer stalk assemblies (D) are available in two inch increments of length. The style of each part is identified by the markings on the exterior surface. Example: STYLE - S2, STYLE - S4, STYLE - S6...etc. Transducer holders (K) are available in two lengths H1 and H2. The H2 stalk is one inch longer than the H1 stalk. By design each ultrasonic meter chord path has been fitted with the appropriate style of transducer stalk assembly (D) and transducer holder (K) best suited for that transducer location. Some transducer locations do not require a transducer stalk assembly (D). In these cases the transducer assembly (J) is connected directly to the transducer holder (K). When replacing a transducer stalk assembly (D) and/or transducer holder (K) it is important for accurate operation that the exact replacement style be used.
9. The electrical circuits connecting the ultrasonic meter transducers (J) to the ultrasonic meter electronics are intrinsically safe circuits. This feature allows these circuits to be safely disconnected and connected in a hazardous atmosphere without the need to disconnect power to the ultrasonic meter electronics. If the meter has more than one pair of transducers, meter operation will only be slightly impaired by the disruption of one pair of transducers at a time. Flow and flow measurement can continue during extractor tool operation.

Section 3: Tool requirements

3.1 Tool list for the extractor tool with T-slot extractable transducers

Table 3-1 Extractor tool list for T-slot extractable transducers

Tool	Tool requirement
3/4” Allen wrench	Fits cap screws (Z).
5/16” Allen wrench	Fits cap screws that attach the transducer mount (E) to the meter housing.
3/32” Allen wrench	Fits the extractor tool valve assembly (H) handle stop peg set screw (HH)
1/16” Allen wrench	Fits the transducer holder (K) and transducer stalk assembly (D) set screws (W).
¾” x ¾” open/box wrench	Fits nuts (X) which attach the piston assembly (P) to the lubricator chamber assembly (M).
1-¼” open end wrench	Fits lubricator chamber extractor rod (N) hexagon nut and transducer holder (K) hexagon end.
Molykote 111[1]	Valve lubricant and sealant to lubricate O-rings before installation.
Nickel Anti-Seize (P/N 9-9960-134)	Anti-seize thread compound for transducer holder (K).
Screw driver - flat blade	To adjust the pressure regulator (V) adjustment screw.
Liquid leak detection fluid	Check all joints for sealing integrity. (Not provided by Daniel Measurement and Control.)

[1] *Molykote III is a trademark of Dow Corning Corporation, U.S.A.*

Section 4: Removing a transducer assembly

4.1 Steps to remove a transducer assembly from a meter while the meter is under line pressure

⚠WARNING

HIGH PRESSURE HAZARD

The ANSI pressure rating is stamped on the extractor tool flange. The customer is required to provide site line pressure. Do not exceed the maximum pressure rating of the extractor tool.

Exceeding the extractor tool pressure rating may cause personal injury from explosion.

1. **Refer to Drawing CE-21060 DETAIL "A"** (Appendix C).
   a. Fully unscrew the chordset coupling nut (C).
   b. Grasp the chordset assembly (A) and pull the chordset assembly away from the transducer mount (E). This unplugs the chordset socket (B) from the transducer holder (K). Position the chordset assembly (A) out of the way of the transducer mount (E) for the duration of the transducer assembly (J) removal and installation.

⚠WARNING

FAULTY EXTRACTOR TOOL INSTALLATION

Do not loosen transducer holders under line pressure without the extractor tool fully installed.

Loosening the transducer holders at full pressure may cause thread damage and leaks.

2. **Refer to Drawing CE-21061 DETAIL "B"** (Appendix C).
   a. Check to make sure the extension (L) fits into the extractor tool valve assembly (H) without catching.
   b. Slide the male T end of the extension (L) into the T-slot in the hexagon end of the transducer holder (K). Align the extension (L) with the transducer holder (K).

3. **Refer to Drawing CE-21062 DETAIL "C"** (Appendix C).

   a. Verify that the seal and backup seal are present on the split clamp end of the extractor tool valve assembly (H). Apply a small amount of valve lubricant Molykote 111 or equivalent lubricant to the O-ring seal.

   b. Using the valve handle, fully open the extractor tool valve assembly (H). The valve is in the full open position when the valve handle contacts the valve handle stop peg set screw (HH).

Important:

If the extractor tool valve assembly (H) is in the closed position, the valve close stop button (S) must be depressed while the valve handle is moved to the open position.

   c. Slide the extractor tool valve assembly (H) over the extension (L) which has been positioned as described in Step 2 above.

   d. Position the split clamp end of the extractor tool valve assembly (H) over the transducer holder (K) and push the split clamp end of the extractor tool valve assembly (H) over the end of the transducer mount (E) securing the O-ring seal of the extractor tool valve assembly (H).

Important:

If the extractor tool valve assembly (H) does not easily pass over the extension (L) the valve may not be in the full open position. Use the valve handle stop peg set screw (HH) to adjust the valve to the full open position. It is important that the extension (L) freely passes through the extractor tool valve assembly (H) when the valve handle is in contact with the valve handle stop peg set screw (HH).

   e. Install each half of the split clamp (F) over the split clamp end of the extractor tool valve assembly (H). The flanged end of the split clamp (F) is to be closest to the mount (E). Engage the ridges in the I.D. of the split clamp (F) into the slots in the mount (E) and extractor tool valve assembly (H).

   f. Rotate the extractor tool valve assembly (H) to position the valve stem in a horizontal plane.

   g. Secure the halves of the split clamp (F) with four screws (G). Tighten to 20 foot-pounds of torque in a star pattern between the two halves of the split clamp.

⚠CAUTION

FAULTY EXTRACTOR TOOL INSTALLATION

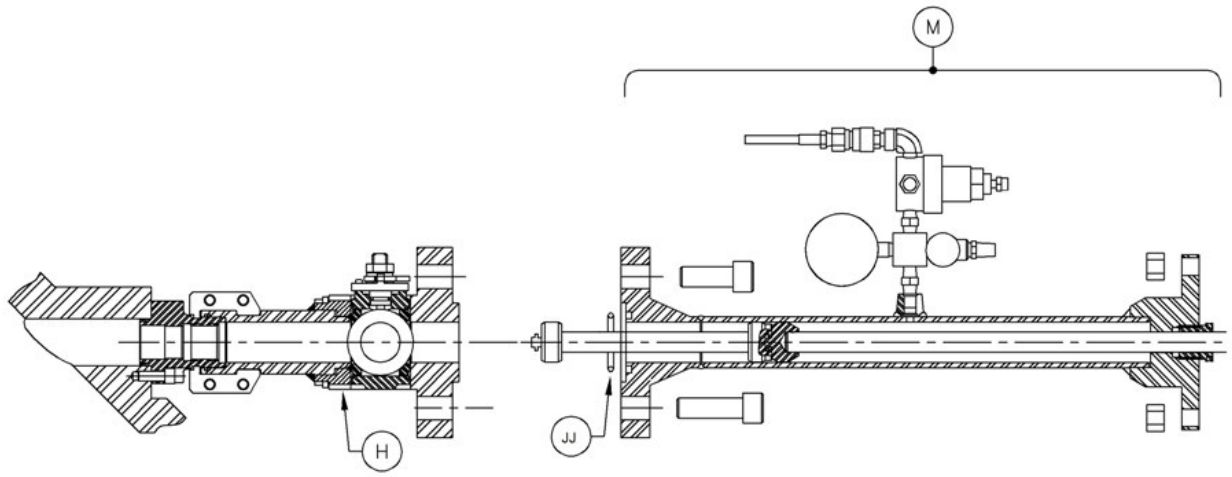
Install the extractor tool split clamp securely to the transducer mount and make sure it is properly seated and not loose.

Improperly seated or loose split clamp may cause the unit to fall and result in injury to personnel or cause damage to the equipment.

4. **Refer to Drawing CE-21063 DETAIL "D"** (Appendix C).

   a. Clean the lubricator chamber assembly (M) end flange sealing face. Clean the extractor tool valve assembly (H) flange sealing face. Verify that the O-ring (JJ) located at the flange end between the lubricator chamber assembly (M) and valve assembly (H) (see Figure 4-2) is not damaged. Contact Daniel Customer Service if replacement is necessary. Apply a small amount of Molykote 111 valve lubricant or equivalent lubricant to the O-ring seal.

Figure 4-2 Extractor tool with O-ring on flange



   b. Extend the lubricator chamber extractor rod (N) from the end of the lubricator chamber assembly (M) exposing the male T on the end of the rod. Connect the extractor rod (N) male T to the end T-slot of the extension (L).

   c. Attach the lubricator chamber assembly (M) flange to the extractor tool valve assembly (H) flange with four cap screws (Z). Use the longer cap screw (Z) in the top bolt hole location which is not in line with the extractor tool valve assembly (H) valve stem. Rotate the lubricator chamber assembly (M) in such a way that convenient access to the valves and gauges of the lubricator chamber assembly (M) is obtained. Securely tighten all cap screws (Z). Minimize the rotation of the extractor tool assembly while tightening the screws.

⚠ CAUTION

VIBRATION HAZARD

Excessive vibration on the pipeline may cause the extractor tool to vibrate. Such vibration could cause a gas leak or other hazard. If the installed unit experiences excessive vibration, discontinue use of the extractor tool.

If this occurs, depressurize the meter and then remove the transducers.

d. Attach extractor tool piston assembly (P) to lubricator chamber assembly (M) by aligning the extractor tool piston assembly (P) end bolts with the lubricator chamber assembly (M) flange bolt holes. During this assembly insert the extractor rod (N) into the center hole of the piston of the extractor tool piston assembly (P). If it is necessary to move the piston to allow assembly, push the piston against the extractor rod (N). During this process the air within the piston cylinder must be vented through the piston orifice fitting (Y) so movement will be slow. Install and tighten the four nuts (X). Minimize the rotation of the extractor tool assembly during nut tightening.

e. Connect the quick connect body (BB) on the end of the low pressure hose attached to the extractor tool piston assembly (P) to the quick connect stem (DD) on the low pressure (secondary) port of the pressure regulator (V).

f. Fully loosen the pressure regulator (V) adjustment screw.

g. Close the lubricator chamber vent valve (R). The extractor tool valve assembly (H) must remain in the full open position.

5. **Refer to Drawing D-08248** (Appendix C).

a. Install the meter housing quick connect stem (FF) to the ultrasonic meter housing line pressure valve (Q). If required, use the reducer provided with the tool kit.

b. Connect the quick connect body (AA) on one end of the high pressure hose to the quick connect stem (FF) on the ultrasonic meter housing line pressure valve (Q) - Customer Supplied - (Refer to Appendix C - Drawings, note Q typical).

⚠WARNING

HIGH PRESSURE HAZARD

The ultrasonic meter housing line pressure valve (Q) is to remain closed until both ends of the high pressure hose are securely connected.

Failure to keep the valve closed until the ends of the hose are securely connected may result in personal injury from explosive forces.

6. **Refer to Drawing CE-21064 DETAIL "E"** (Appendix C).

   a. Connect the quick connect body (AA) on the remaining end of the high pressure hose to the quick connect stem (CC) on the high pressure (primary) port of the pressure regulator (V).

   b. Open the ultrasonic meter housing line pressure valve (Q) to pressurize the lubricator chamber. Continue to pressurize the lubricator chamber until lubricator pressure gauge (T) indicates the chamber reaches line pressure.

⚠WARNING

LINE PRESSURE HAZARD

The meter line pressure controls the motion of the exposed lubricator extractor rod. Moving parts may cause cutting or crushing to extremities during operation.

Failure to keep extremities clear of the extractor rod may cause injury to personnel.

   c. Check all joints of the ultrasonic meter housing line pressure valve (Q), high pressure hose fittings, lubricator chamber assembly (M) and extractor tool valve assembly (H) for leaks with a leak detection solution.

   d. If a leak is detected, immediately stop. Depressurize the extractor tool by closing the ultrasonic meter housing line pressure valve (Q) and opening the lubricator chamber vent valve (R).

⚠WARNING

LEAKAGE HAZARD

If a leak is detected, immediately stop and depressurize the extractor tool as described above.

Failure to repair all leaks could result in personal injury from explosive forces or asphyxiation.

   e. Repair the leaking joint, close the lubricator chamber vent valve (R) and repressurize the lubricator chamber as described above.

f. Adjust the pressure on the extractor tool piston assembly (P) to exceed the force of line pressure exerted on the extractor rod (N). Refer to Table A-1 piston and line pressure chart. To do this,

- Slowly rotate the pressure regulator (V) adjustment screw in a clockwise direction.
- Monitor the line pressure indicated on the lubricator chamber pressure gauge (T).
- Continue turning the adjustment screw until the extractor tool piston assembly (P) pressure indicates the line pressure shown in Table A-1.
- The outside surface of the piston assembly (P) cylinder lists a corresponding piston pressure chart for the line pressure measured on the lubricator chamber pressure gauge (T).

g. Using an open end 1-¼" wrench on the hex of the lubricator chamber extractor rod (N), fully unscrew the transducer holder (K) from transducer mount (E). As the extractor rod (N) is rotated in the counter-clockwise direction watch for lateral movement of the extractor rod (N). When the lateral movement no longer occurs the transducer holder (K) is completely free of the transducer mount (E).

h. Reduce the pressure of the extractor tool piston assembly (P) by fully unscrewing (counter-clockwise) the adjustment screw of the pressure regulator (V) until loose. The piston orifice fitting (Y) will slowly allow pressure to vent from the extractor tool piston assembly (P) causing the extractor rod (N) to slowly retract to a fully retracted position which is indicated by the visibility of a mark on the extractor rod (N) at the end of the lubricator chamber assembly (M). If the extractor rod (N) becomes jammed, which may be indicated by the stopping of the movement of the extractor rod (N) before the piston is fully retracted, verify that the extractor tool valve assembly is in the full open position.

Important

The extractor tool is designed with a shear pin safety device intended to shear off if the transducer holder is frozen or galled in place. If the shear pin is sheared off, stop the extraction procedure and blow the line down.

i. Verify all pressure has been vented from the extractor tool piston assembly (P) by reading the piston pressure gauge (U). Do not proceed until piston pressure gauge (U) indicates zero pressure, and the extractor rod has stopped moving.

⚠WARNING

INHALATION HAZARD

Escaping gases released when line is vented may be toxic. Do not inhale the gases vented to the atmosphere from the pipeline. Do not position yourself directly in front of vented gases.

Failure to avoid inhaling vented gases may result in injury.

j. Verify that the mark on the extractor rod (N) is visible at the packing gland end of the lubricator chamber assembly (M). Do not proceed until the extractor rod (N) is fully retracted to avoid possible transducer assembly (J) damage by closing the extractor tool valve assembly (H) with the transducer assembly (J) within the ball of the valve.

k. Close the extractor tool valve assembly (H). The valve handle will automatically lock the valve in the closed position. If the valve will not close, the transducer assembly (J) may not be fully retracted. See Step f above.

l. Fully close the ultrasonic meter housing line pressure valve (Q) and vent all pressure from the lubricator chamber assembly (M) by opening the lubricator chamber vent valve (R). The lubricator chamber pressure gauge (T) should indicate zero pressure.

m. To check the sealing integrity of the extractor tool valve assembly (H), close the lubricator chamber vent valve (R). Wait several minutes and observe lubricator chamber pressure gauge (T). If zero pressure is indicated by the gauge, this confirms that sealing is successful. Open the lubricator chamber vent valve (R).

⚠WARNING

SEALING HAZARD

If the lubricator chamber pressure gauge (T) indicates pressure in the lubricator chamber assembly (M) after a period of time, the extractor tool valve assembly (H) seals may be leaking. If this is observed proceed to Section 4.1**,** Step 1**A) of the instructions "Steps to install a transducer assembly while the meter is under line pressure" and re-install the transducer holder (K).**

Failure to repair all leaks could result in personal injury from explosive forces or asphyxiation.

7. **Refer to Drawing D-08248 DETAIL "G"** (Appendix C).

   a. Remove the meter housing quick connect stem and reducer if it was required. Return the parts to the tool kit.

   b. Disconnect the high pressure hose quick connect body (AA) from quick connect stem (FF) on the ultrasonic meter housing line pressure valve (Q). Disconnect the high pressure hose quick connect body (AA) from quick connect stem (CC) on the pressure regulator (V) high pressure (primary) port.

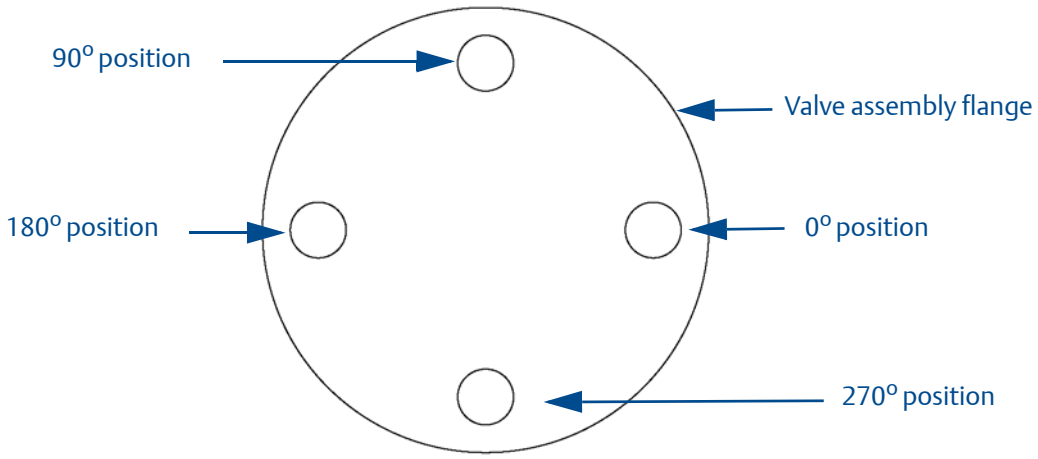
   c. Disconnect the low pressure hose quick connect body (BB) from the quick connect stem (DD) on the pressure regulator (V) low (secondary) pressure port. Wrap the low pressure hose around the extractor tool piston assembly (P) and connect the low pressure hose quick connect body (BB) to the quick connect stem (EE) located on the extractor tool piston assembly (P) flange for storage.

8. **Refer to Drawing CE-21065 DETAIL "F"** (Appendix C).

   a. Loosen and remove the four extractor tool piston assembly (P) nuts (X) from the flange on the lubricator chamber assembly (M). Minimize the rotation of the extractor tool assembly during nut removal. Remove the extractor tool piston assembly (P) from the lubricator chamber assembly (M). For safe keeping reinstall the nuts (X) after removal.

b. Loosen all four of the lubricator chamber cap screws (Z) on the lubricator chamber assembly (M) flange from the extractor tool valve assembly (H) flange. Minimize the rotation of the extractor tool assembly during screw removal. Remove the three short lubricator chamber cap screws (Z), but do not remove the one long lubricator chamber cap screw located at the 90° position. Loosen this screw so the end of the screw is flush with the back side of the extractor tool valve assembly (H) flange.

Figure 4-3 Lubricator chamber assembly flange screws



c. Pull on the lubricator chamber assembly (M) to disconnect the lubricator chamber assembly (M) flange from the extractor tool valve assembly (H) flange. Pivot the lubricator chamber on the remaining long cap screw.

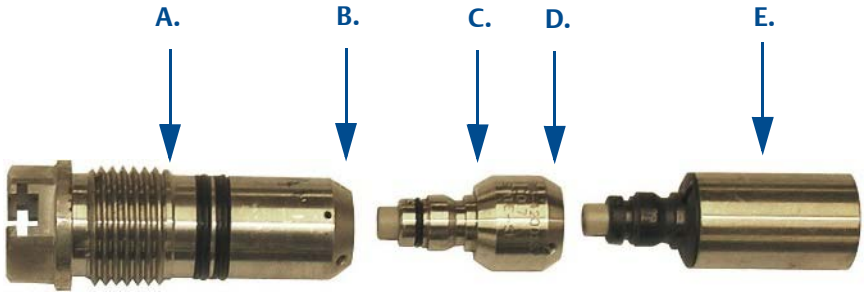
d. Reinstall a short cap screw at either the 0° or the 180° position (see Figure 4-3) and rest the lubricator chamber flange on the reinstalled short cap screw. This is to leave the lubricator chamber assembly (M) bore exposed.

e. Push on the lubricator chamber extractor rod (N) exposing the transducer assembly (J), transducer stalk assembly (D) [if fitted], transducer holder (K), and the end of the extension (L) from the end of the lubricator chamber assembly (M).

f. Grasp the transducer holder (K) and disconnect the T-slot in the end of the transducer holder (K) from the extension (L) T end.

g. Remove the transducer assembly (J) (Figure 4-4, E) from the transducer stalk assembly (D) (Figure 4-4, C) or, on some meters, the transducer holder (K) (Figure 4-4, A) by unscrewing the three set screws (W) (Figure 4-4, D) on the transducer stalk assembly (D) or, transducer holder (K) (Figure 4-4, B). Clean or replace the transducer assembly (J) as needed.

Figure 4-4 Transducer holder, stalk and transducer assembly



A. Transducer holder
B. Transducer holder set screws
C. Transducer stalk assembly
D. Transducer stalk assembly set screws
E. Transducer assembly

h. Review the Part Replacement notes in Section 2.2 for instructions on replacement of transducer assemblies (J) and other mounting parts.

Section 5: Installing a transducer assembly

5.1 Installing a transducer assembly while the meter is under line pressure

1. **Refer to Drawing CE-21065 DETAIL "F"** (Appendix C).
   a. Review the notes in Section 2.2 at the beginning of this procedure for instructions on replacement of transducer assemblies (J) and other mounting parts.
   b. Clean the transducer assembly (J), transducer stalk assembly (D), if fitted, and the transducer holder (K). Take particular care to clean the transducer holder (K) threads. Replace the O-ring seals on the transducer holder (K).
   c. Clean, inspect and replace as needed, the O-ring seal on the male connector end of the transducer assembly (J).
   d. Apply a small amount of valve lubricant or other suitable grease to the O-ring seal on the male connector end of the transducer assembly (J).
   e. Align the slot on the male connector end of the transducer assembly (J) with the pin within the mating connector female end of the transducer stalk assembly (D), or the transducer holder (K). Press the two parts together. Equally tighten the three set screws (W) on the transducer stalk assembly (D), or the transducer holder (K) securing the transducer assembly (J) in place.
   f. With the extension (L) protruding from the flange end of the lubricator chamber assembly (M) install the transducer holder (K) by engaging the T on the extension (L) with the T-slot on the transducer holder (K). Once the connection has been made, retract the extractor rod (N) enough so the T-slot joint is inside the bore of the lubricator chamber assembly (M). This secures the attachment.
   g. Apply an ample amount of anti-seize compound to the threads of the transducer holder (K). Apply a small amount of valve lubricant or other suitable grease to the O-rings of the transducer holder (K).
2. **Refer to Drawing CE-21064 DETAIL "E"** (Appendix C).
   a. Fully retract the extractor rod (N) within the lubricator chamber assembly (M). Confirmation of full retraction is indicated by a mark on the extractor rod (N) at the end of the lubricator chamber assembly (M). When this mark is visible the extractor rod (N) is fully retracted.
   b. Clean the lubricator chamber assembly (M) end flange sealing face. Clean the extractor tool valve assembly (H) flange sealing face. Apply a small amount of valve lubricant or other suitable grease to the O-ring seal on the flange end of the lubricator chamber assembly (M).
   c. Rotate and align the lubricator chamber assembly (M) flange to the extractor tool valve assembly (H) flange and attach with four cap screws (Z). Securely tighten all cap screws (Z) evenly, keeping the faces of both flanges parallel. Minimize the rotation of the extractor tool assembly during screw tightening.

d. Align the extractor rod (N) into the center hole of the piston of the extractor tool piston assembly (P). The piston should be fully retracted inside the extractor tool piston assembly (P).

Important:

If the piston is not fully retracted, use a long rod or dowel to force the piston back into the extractor tool piston assembly (P). During this process the air within the piston cylinder must be vented through the piston orifice fitting (Y) so movement will be slow.

e. Attach the extractor tool piston assembly (P) to the lubricator chamber assembly (M) by aligning the extractor tool piston assembly (P) end bolts with the lubricator chamber assembly (M) flange bolt holes. Install and equally tighten the four nuts (X). Minimize the rotation of the extractor assembly during nut tightening.

f. Connect the quick connect body (BB) on the end of the low pressure hose attached to the extractor tool piston assembly (P) to the quick connect stem (DD) on the low pressure (secondary) port of the pressure regulator (V).

g. Ensure that the pressure regulator (V) adjustment screw is fully loosened (counterclockwise).

h. Close the lubricator chamber vent valve (R). The ultrasonic meter housing line pressure valve (Q) and extractor tool valve assembly (H) are to remain closed.

i. Connect the quick connect body (AA) on one end of the high pressure hose to the quick connect stem (CC) on the high pressure (primary) port of the pressure regulator (V).

3. **Refer to Drawing D-08248** (Appendix C).

   a. Connect the quick connect body (AA) on the remaining end of the high pressure hose to the quick connect stem (FF) on the ultrasonic meter housing line pressure valve (Q). Customer Supplied - (Refer to Appendix C, Drawings, note Q typical). Refer to Drawing CE-21063 DETAIL "D" **(**Appendix C**)**

⚠WARNING

HIGH PRESSURE HAZARD

The ultrasonic meter housing line pressure valve (Q) is to remain closed until both ends of the high pressure hose are securely connected.

Failure to do so could result in personal injury from explosive forces or sudden whipping of the line.

   b. Open the ultrasonic meter housing line pressure valve (Q) to pressurize the lubricator chamber to line pressure. Observe line pressure on lubricator chamber pressure gauge (T) to ensure the lubricator chamber reaches line pressure.

   c. Check all joints of the ultrasonic meter housing line pressure valve (Q), high pressure hose fittings, lubricator chamber assembly (M) and extractor tool valve assembly (H) for leaks with a leak detecting solution. If any leaks occur depressurize the extractor tool by closing ultrasonic meter housing line pressure valve (Q) and open the lubricator chamber vent valve (R). Repair the leaking joint, close the lubricator chamber vent valve (R) and repressurize the lubricator chamber as described above.

   d. Open the extractor tool valve assembly (H) by depressing the valve close stop button (S) while moving the handle to the full open position. The valve is full open when the valve handle contacts the valve handle stop peg set screw (HH).

e. Adjust the pressure on the extractor tool piston assembly (P) to slightly exceed the force of line pressure acting on the extractor rod (N).

Slowly rotate the pressure regulator (V) adjustment screw in a clockwise direction until the extractor tool piston assembly (P) pressure, as shown on the piston pressure gauge (U), indicates line pressure greater than the piston pressure as shown in Table A-1.

For the line pressure indicated on the lubricator chamber pressure gauge (T), refer to the Extractor Tool Piston Pressure chart or Table A-1. Once the pressure given in the chart is achieved, slowly turn the adjustment screw in the clockwise direction a little farther to allow the force of the pressure to overcome the friction of the extractor rod (N) seals.

When the piston pressure force exceeds all of the forces acting on the extractor rod (N), the extra ctor rod (N) will begin to slowly move towards the ultrasonic meter. Continue until the transducer holder (K) contacts the transducer mount (E) flange.

f. The hex nut on the extractor rod (N) should be accessible in the open space between the lubricator chamber assembly (M) and the extractor tool piston assembly (P). If this does not occur, retract the rod by loosening the pressure regulator (V) adjustment screw to retract the rod (N).

g. Ensure that the valve (H) is fully open, then repeat this step. When the transducer holder (K) contacts the transducer mount (F) the threads of the two parts should automatically align with each other and the rod (N) hex will be accessible in the open space between the lubricator chamber (M) and piston assembly (P). Use a 1-¼" open end wrench on the hex of the extractor rod (N) to screw the transducer holder (K) into the transducer mount (E).

As the extractor rod (N) is rotated in the clockwise direction watch for lateral movement of the extractor rod (N). The lateral movement will confirm thread engagement. When tight, the transducer holder (K) is completely threaded onto the transducer mount (E).

Important

The threaded joint of the T-slot transducer holder (K) to the transducer mount (E) does not have a recommended torque requirement. The transducer holder (K) is to be tightened sufficiently so the shoulder on the transducer holder (K) is fully seated.

⚠CAUTION

EXCESSIVE TORQUE HAZARD

Do not exceed 300 foot-pounds of torque on the extractor rod or the rod nut. Excessive torque will shear the extractor rod hex nut pin.

Excessive torque applied during operation may cause equipment damage.

h. Vent the pressure of the extractor tool piston assembly (P) by fully unscrewing (counterclockwise) the adjustment screw of the pressure regulator (V) until loose. The piston orifice fitting (Y) will slowly allow pressure to vent from the extractor tool piston assembly (P). The piston pressure gauge (U) should indicate zero pressure.

i. Fully close the ultrasonic meter housing line pressure valve (Q) and vent all pressure from the lubricator chamber assembly (M) by opening the lubricator chamber vent valve (R). The lubricator chamber pressure gauge (T) should indicate zero pressure.

j. To check the sealing integrity of the transducer holder (K), close the lubricator chamber vent valve (R). Wait several minutes and observe lubricator chamber pressure gauge (T). If no pressure is indicated by the gauge, sealing is successful. Open the lubricator chamber vent valve (R).

k. If the lubricator chamber pressure gauge (T) indicates pressure in the lubricator chamber assembly (M) some time after the lubricator chamber vent valve (R) has been opened to vent pressure and again closed, then the transducer holder (K) seals may not be sealing line pressure.

⚠WARNING

SEALING HAZARD

If the transducer holder does not seal, repeat Section 4.1**,** Step 7**, to remove the transducer holder (K) and replace the seals and/or take other actions as needed to correct the problem.**

Failure to seal line pressure could result in possible personal injury.

4. **Refer to Drawing D-08248** (Appendix C).

   a. Remove the meter housing quick connect stem and the reducer if it was required. Return the parts to the tool kit.

   b. Disconnect the high pressure hose quick connect body (AA) from the ultrasonic meter housing line pressure valve (Q) quick connect stem (FF) and the other high pressure hose quick connect body (AA) from the quick connect stem (CC) on the pressure regulator (V) high pressure (primary) port. Remove and store the high pressure hose.

   c. Disconnect the low pressure hose quick connect body (BB) from the quick connect stem (DD) on the pressure regulator (V) low pressure (secondary) port. Wrap the low pressure hose around the extractor tool piston assembly (P) and connect the low pressure hose quick connect body (BB) to the quick connect stem (EE) located on the extractor tool piston assembly (P) flange for storage.

5. **Refer to Drawing CE-21065 DETAIL "F"** (Appendix C).

   a. Loosen and remove the four extractor tool piston assembly (P) nuts (X). Minimize the rotation of the extractor tool assembly during nut removal. Pull the extractor tool piston assembly (P) away from the lubricator chamber assembly (M). For safe keeping reinstall the nuts (X) after removal. Remove and store the extractor tool piston assembly (P).

   b. Loosen and remove all four of the lubricator chamber cap screws (Z) on the lubricator chamber assembly (M) flange from the extractor tool valve assembly (H) flange. Minimize the rotation of the extractor tool assembly during screw removal. Pull on the lubricator chamber assembly (M) to disconnect the lubricator chamber assembly (M) flange from the extractor tool valve assembly (H) flange. During disassembly disconnect the extractor rod (N) end T from the end of the extension (L) T-slot by extending the extractor rod (N) from the end of the lubricator chamber assembly (M). Remove and store the lubricator chamber assembly (M).

6. **Refer to Drawing CE-21062 DETAIL "C"** (Appendix C).

   Loosen and remove the four split clamp screws (G). Remove both halves of the split clamp (F) and store. When the split clamp (F) is fully disconnected from the transducer mount (E) pull the extractor tool valve assembly (H) away from the transducer mount (E). When free of the transducer mount (E) continue to pull the extractor tool valve assembly (H) while guiding the extension (L) through the bore of the valve. Remove and store the extractor tool valve assembly (H).

7. **Refer to Drawing CE-21061 DETAIL "B"** (Appendix C).

   Slide the extension (L) end T from the T-slot within the transducer holder (K). Remove and store the extension (L).

8. **Refer to Drawing CE-21060 DETAIL "A"** (Appendix C).

   a. Use a leak detecting fluid around the joint of the transducer holder (K) to transducer mount (E) joint to check the seals of the transducer holder (K).

⚠WARNING

LEAKAGE HAZARD

If a leak is detected, repeat the steps to remove a transducer assembly while the meter is under line pressure (see Section 4.1).

Failure to repair the leaking transducer holder (K) seals could cause exposure to escaping gases or an explosion resulting in possible personal injury.

   b. Clean, inspect and replace as needed the O-ring seal in the chordset coupling nut (C). Apply a small amount of valve lubricant or other suitable grease to this O-ring seal.

   c. Grasp the chordset assembly (A). Align the slot in the chordset socket (B) with the key pin within the transducer holder (K). Connect the chordset socket (B) to the pins within the transducer holder (K) by pressing the chordset assembly (A) into the transducer holder (K). After the connection has been made, turn the chordset coupling nut (C) of the chordset assembly (A) to screw the chordset coupling nut (C) into the transducer holder (K).

   d. Verify the electrical connections by connecting to the meter using Daniel MeterLink and select the Meter | Monitor (Detailed) view. Check the flow profile, chord performance, gains, and Signal-to-noise ratios to ensure the transducer signal quality is good. If transducer assembly parts were replaced with new parts, review the notes at the beginning of this procedure for instructions on replacement of transducer assembly parts.

   e. Additional transducer assembly extractions require the disassembly of the extractor tool and require following the disassembly procedure in Section 4.1.

Section 6: Maintenance

6.1 Extractor tool maintenance

The Split Clamp Extractor Tool must be returned to our factory annually or after fifty (50) transducer extractions, whichever comes first, for maintenance and recertification for field operations.

However, in the case of severe operation, dirty conditions, or other unique applications that may subject the equipment to extreme circumstances, Daniel recommends a more frequent maintenance schedule.

Section 7: Parts list

7.1 Extractor tool parts list

Table 7-1 Extractor tool parts list

Parts list	Description
A	Chordset assembly
B	Chordset socket
C	Chordset coupling nut
D	Transducer stalk assembly
E	Transducer mount
F	Extractor tool valve split clamp
G	Split clamp screws
H	Extractor tool valve assembly
J	Transducer assembly
K	Transducer holder
L	Extension
M	Lubricator chamber assembly
N	Lubricator chamber extractor rod
P	Extractor tool piston assembly
Q	Ultrasonic meter housing line pressure valve (customer supplied)
R	Lubricator chamber vent valve
S	Valve close stop button
T	Lubricator chamber pressure gauge
U	Piston pressure gauge
V	Pressure regulator
W	Transducer stalk set screws
X	Extractor tool piston assembly nuts
Y	Piston orifice fitting
Z	Lubricator chamber cap screws
AA	High pressure hose quick connect body
BB	Low pressure hose quick connect body
CC	High pressure hose quick connect stem
DD	Low pressure hose quick connect stem
EE	Low pressure hose quick connect stem (for storage)
FF	Meter housing quick connect stem (comes with the extractor tool)
HH	Valve handle stop peg set screw
JJ	Lubricator chamber assembly O-ring seal

Appendix A: Piston and line pressure

A.1 Extractor tool piston pressure

Use Table A-1 to determine the extractor tool piston pressure needed to stabilize the extractor tool lubricator chamber extractor rod (N) against line pressure.

- Lubricator extractor rod diameter = 0.75
- Extractor tool piston diameter=3.75

Table A-1 Extractor tool piston and line pressure stabilization

Line pressure (PSI)	Piston pressure (PSI)	Line pressure (PSI)	Piston pressure (PSI)	Line pressure (PSI)	Piston pressure (PSI)
25	1	525	21	1025	41
50	2	550	22	1050	42
75	3	575	23	1075	43
100	4	600	24	1100	44
125	5	625	25	1125	45
150	6	650	26	1150	46
175	7	675	27	1175	47
200	8	700	28	1200	48
225	9	725	29	1225	49
250	10	750	30	1250	50
275	11	775	31	1275	51
300	12	800	32	1300	52
325	13	825	33	1325	53
350	14	850	34	1350	54
375	15	875	35	1375	55
400	16	900	36	1400	56
425	17	925	37	1425	57
450	18	950	38	1450	58
475	19	975	39	1475	59
500	20	1000	40	1500	60

Table A-1 Extractor tool piston and line pressure stabilization

Line pressure (PSI)	Piston pressure (PSI)	Line pressure (PSI)	Piston pressure (PSI)	Line pressure (PSI)	Piston pressure (PSI)
1525	61	2025	81	2525	101
1550	62	2050	82	2550	102
1575	63	2075	83	2575	103
1600	64	2100	84	2600	104
1625	65	2125	85	2625	105
1650	66	2150	86	2650	106
1675	67	2175	87	2675	107
1700	68	2200	88	2700	108
1725	69	2225	89	2725	109
1750	70	2250	90	2750	110
1775	71	2275	91	2775	111
1800	72	2300	92	2800	112
1825	73	2325	93	2825	113
1850	74	2350	94	2850	114
1875	75	2375	95	2875	115
1900	76	2400	96	2900	116
1925	77	2425	97	2925	117
1950	78	2450	98	2950	118
1975	79	2475	99	2975	119
2000	80	2500	100	3000	120
3025	121	3325	133	3625	145
3050	122	3350	134	3650	146
3075	123	3375	135	3675	147
3100	124	3400	136	3700	148
3125	125	3425	137	3725	149
3150	126	3450	138	3750	150
3175	127	3475	139		
3200	128	3500	140		
3225	129	3525	141		
3250	130	3550	142		
3275	131	3575	143		
3300	132	3600	144		

Appendix B: Extractor tool pre-use and post-use inspection checklist

B.1 Inspection checklist

Use the following checklist prior to and after using the extractor tool and to ensure the tool is in good working condition.

Table B-1 Inspection checklist

Extractor tool pre-use and post-use inspection checklist	
	Verify the shaft on the Lubricator Chamber Assembly is clean and free of dirt, can be smoothly pulled out and pushed back in and that the scribe mark can be easily seen.
	Visually inspect and make sure the four bolts that hold the Piston Assembly onto the Lubricator Chamber Assembly are clean and threads not galled or damaged.
	Visually verify that all hoses are intact with no kinks or tears.
	Verify that the Piston Assembly pressure hose is attached and tight.
	Visually verify that there are no leaks at the NPT thread connections.
	Verify pressure gauge on the Lubricator Chamber Assembly is indicating the correct pressure (300psi).
	Visually verify the regulator on the Lubricator Chamber Assembly is functioning properly.
	Verify that the Piston Assembly pressure gauge indicates the correct pressure (300 psi)
	Make sure that there are at least eight (8) O-rings, backup O-rings and lubricant to replace all transducers extracted. Order a sufficient quantity of O-rings and lubricant for the transducer swap-out procedure and enough for next time use.
	Contact Daniel Customer Service for any replacement parts or if any failures occur during this inspection.

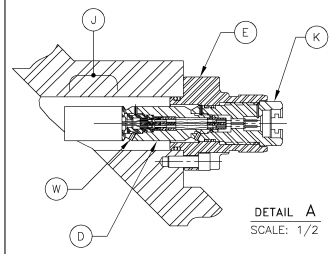
Comments:

Notes:

Appendix C: Engineering drawings

C.1 Extractor tool drawings

D-08248	Ultrasonic Meter Transducer Extractor Tool Operation Assembly
CE-21060	Detail “A” of D-08248
CE-21061	Detail “B” of D-08248
CE-21062	Detail “C” of D-08248
CE-21063	Detail “D” of D-08248
CE-21064	Detail “E” of D-08248
CE-21065	Detail “F” of D-08248
CE-21066	Detail “G” of D-08248



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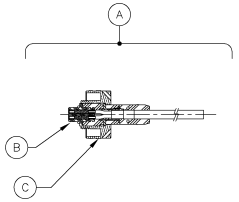

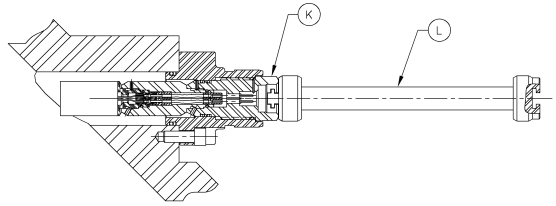

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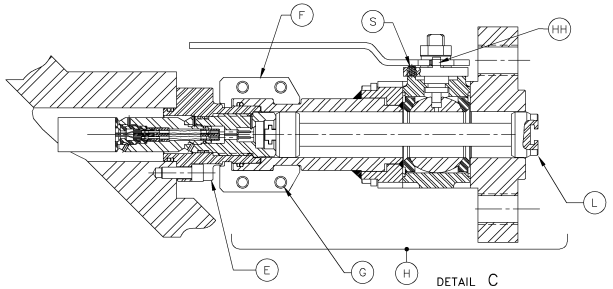

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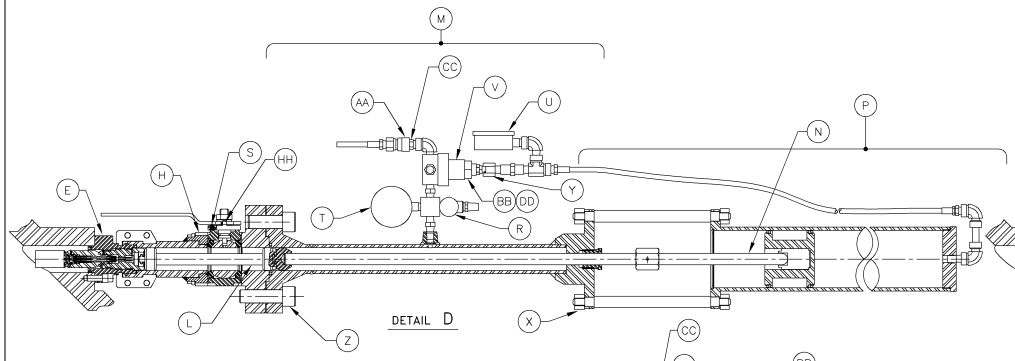

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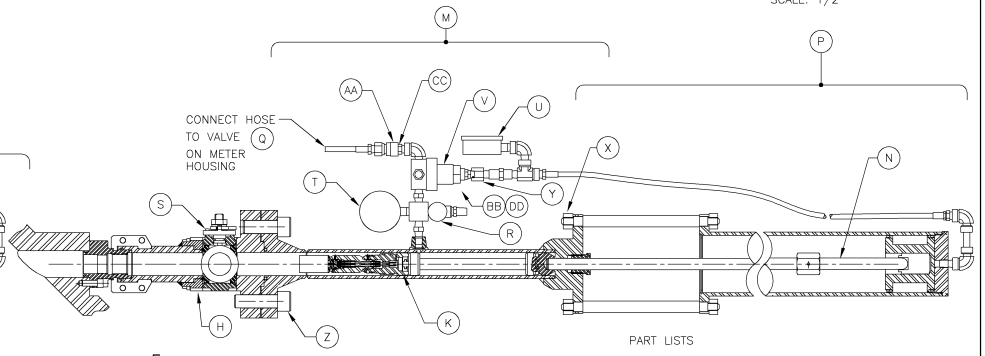

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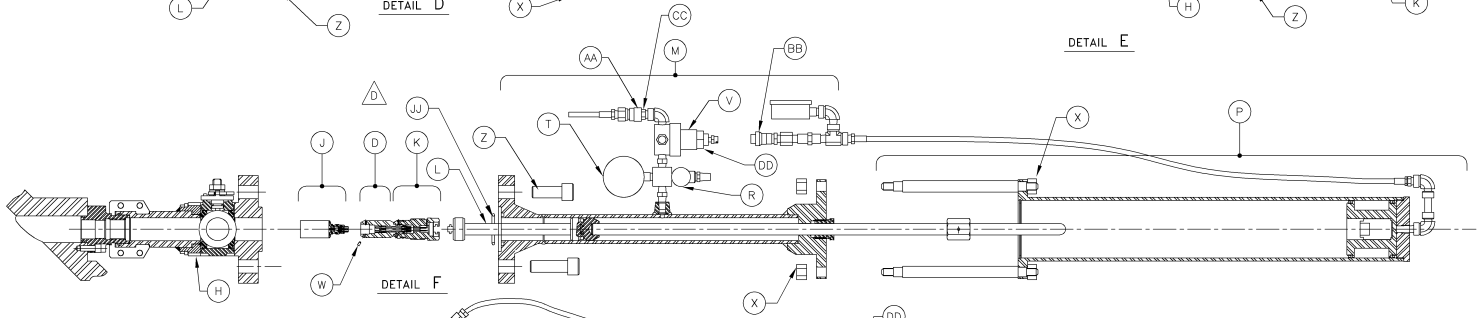

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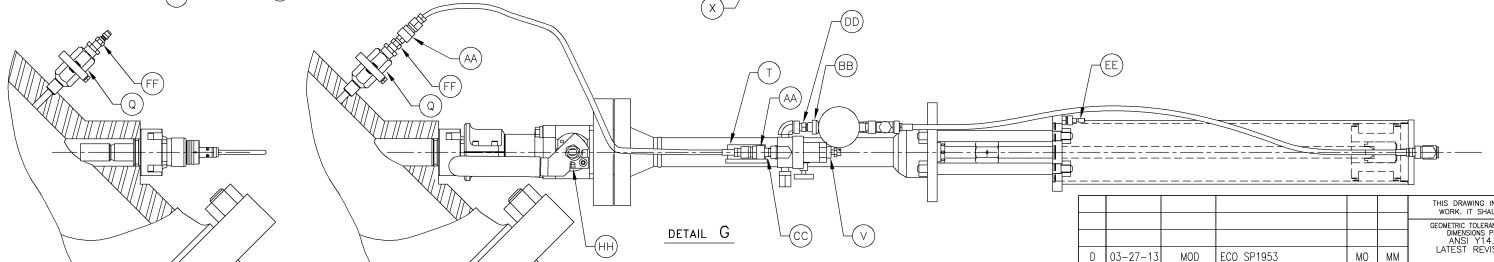

DETAIL G

NOTE:
1. FOR INSTRUCTIONS TO REMOVE AND INSTALL THE TRANSDUCER / STALK ASSEMBLY WHILE THE METER IS UNDER LINE PRESSURE SEE: ULTRASONIC EXTRACTOR TOOL OPERATION MANUAL: PART NUMBER: 3-9000-744

PART LISTS

A	CORDSET ASSEMBLY
B	CORDSET SOCKET
C	CORDSET COUPLING NUT
D	TRANSDUCER STALK ASSEMBLY
E	TRANSDUCER MOUNT
F	EXTRACTOR TOOL VALVE SPLIT CLAMP
G	SPLIT CLAMP SCREWS
H	EXTRACTOR TOOL VALVE ASSEMBLY
J	TRANSDUCER ASSEMBLY
K	TRANSDUCER HOLDER
L	EXTENSION
M	LUBRICATOR CHAMBER ASSEMBLY
N	LUBRICATOR CHAMBER EXTRACTOR ROD
P	EXTRACTOR TOOL PISTON ASSEMBLY
Q	ULTRASONIC METER HOUSING LINE PRESSURE VALVE (CUSTOMER SUPPLIED)
R	LUBRICATOR CHAMBER VENT VALVE
S	VALVE CLOSE STOP BUTTON
T	LUBRICATOR CHAMBER PRESSURE GAUGE
U	PISTON PRESSURE GUAGE
V	PRESSURE REGULATOR
W	TRANSDUCER STALK SET SCREWS
X	EXTRACTOR TOOL PISTON ASSEMBLY NUTS
Y	PISTON ORIFICE FITTING
Z	LUBRICATOR CHAMBER CAPSCREWS
AA	HIGH PRESSURE HOSE QUICK CONNECT BODY
BB	LOW PRESSURE HOSE QUICK CONNECT BODY
CC	HIGH PRESSURE HOSE QUICK CONNECT STEM
DD	LOW PRESSURE HOSE QUICK CONNECT STEM
EE	LOW PRESSURE HOSE QUICK CONNECT STEM (FOR STORAGE)
FF	METER HOUSING QUICK CONNECT STEM (COMES WITH EXTRACTOR TOOL)
HH	VALVE HANDLE STOP PEG SET SCREW
JJ	LUBRICATOR CHAMBER ASSEMBLY O-RING SEAL

REV	DATE	DRN	DESCRIPTION	CHKD	APPD
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C	02-12-13	MOD	ECO SP1913	MO	MM
B	10-11-02	MOD	ECO X-156901	MO	CRA
A	09-24-02	MOD	RELEASED	MO	CRA

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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

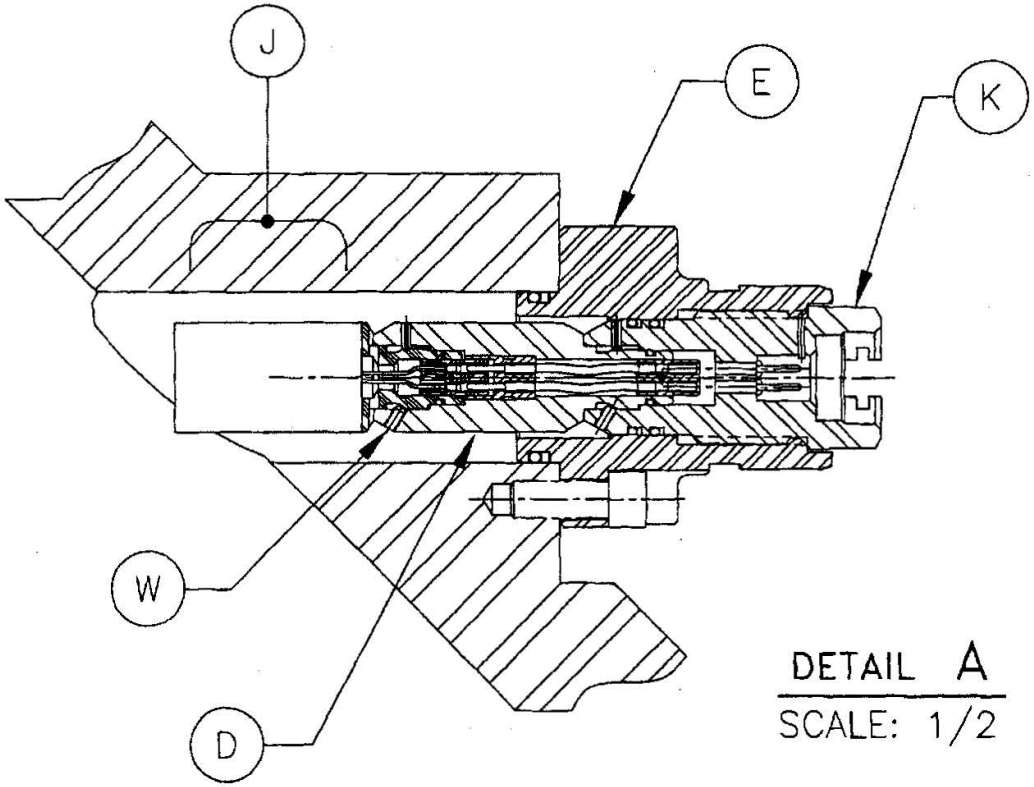
UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±0° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

DANIEL MEASUREMENT AND CONTROL DIVISION HOUSTON, TEXAS 77024

TITLE: ULTRASONIC METER TRANSDUCER EXTRACTOR TOOL OPERATION ASSEMBLY T SLOT J & K MOUNT

DRN MOD	DATE 09-18-02	DWG NO. D-08248	REV D
CHKD MARK	DATE 09-19-02		
APPD CRA	DATE 09-24-02	SCALE 1/4 P/N BLOCK N/A	SHT 1 OF 1



DETAIL A

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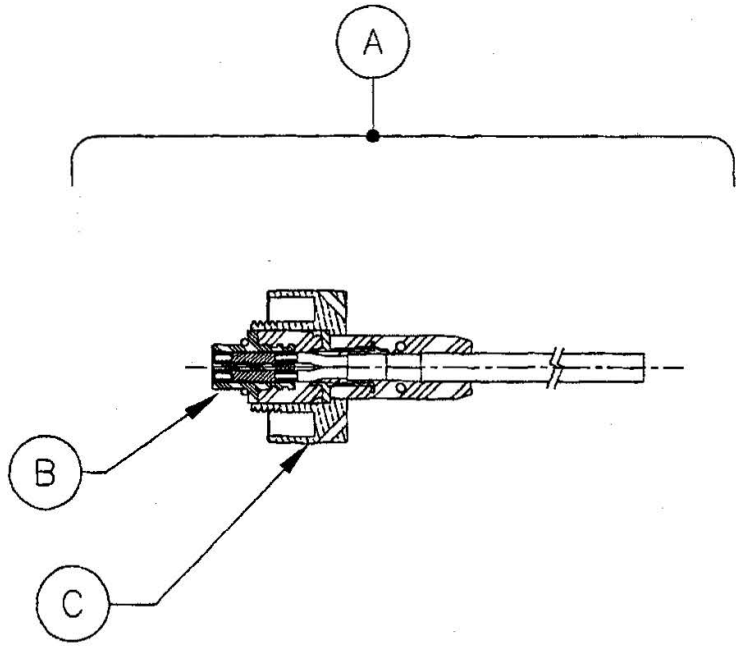

PART LISTS

△B	A	CORDSET ASSEMBLY
	B	CORDSET SOCKET
	C	CORDSET COUPLING NUT
	D	TRANSDUCER STALK ASSEMBLY
	E	TRANSDUCER MOUNT
	J	TRANSDUCER ASSEMBLY
	K	TRANSDUCER HOLDER
	W	TRANSDUCER STALK SET SCREWS

REV	DATE	DRN	DESCRIPTION	CHKD	APPD
B	10-11-02	MOD	ECO X-156901	MO	CRA
A	09-24-02	MOD	RELEASED	MO	CRA

SI METRIC

THIRD ANGLE PROJECTION

MATERIAL

FINISH

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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

DANIEL

TITLE: DETAIL "A" OF D-08248

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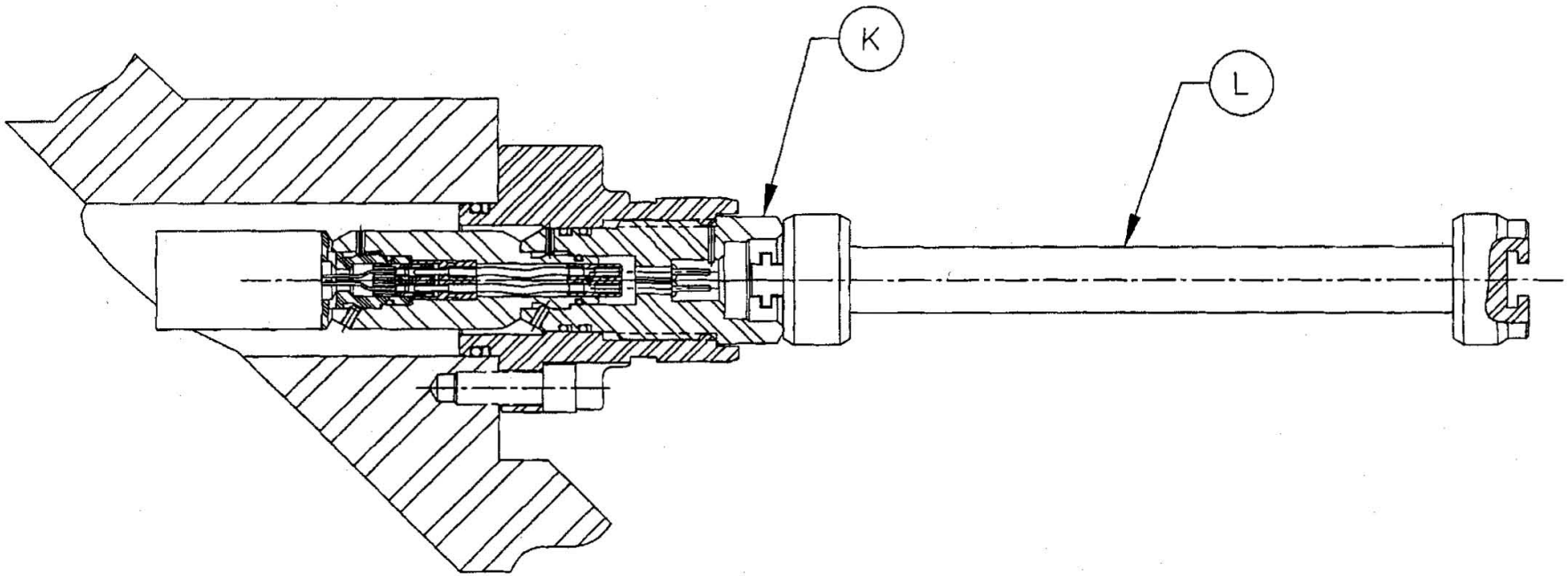

DETAIL B

SCALE: 1/2

PART LISTS

K TRANSDUCER HOLDER
L EXTENSION

SI METRIC						
THIRD ANGLE PROJECTION						
MATERIAL						
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UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±0° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

DANIEL

TITLE: DETAIL "B" OF D-08248

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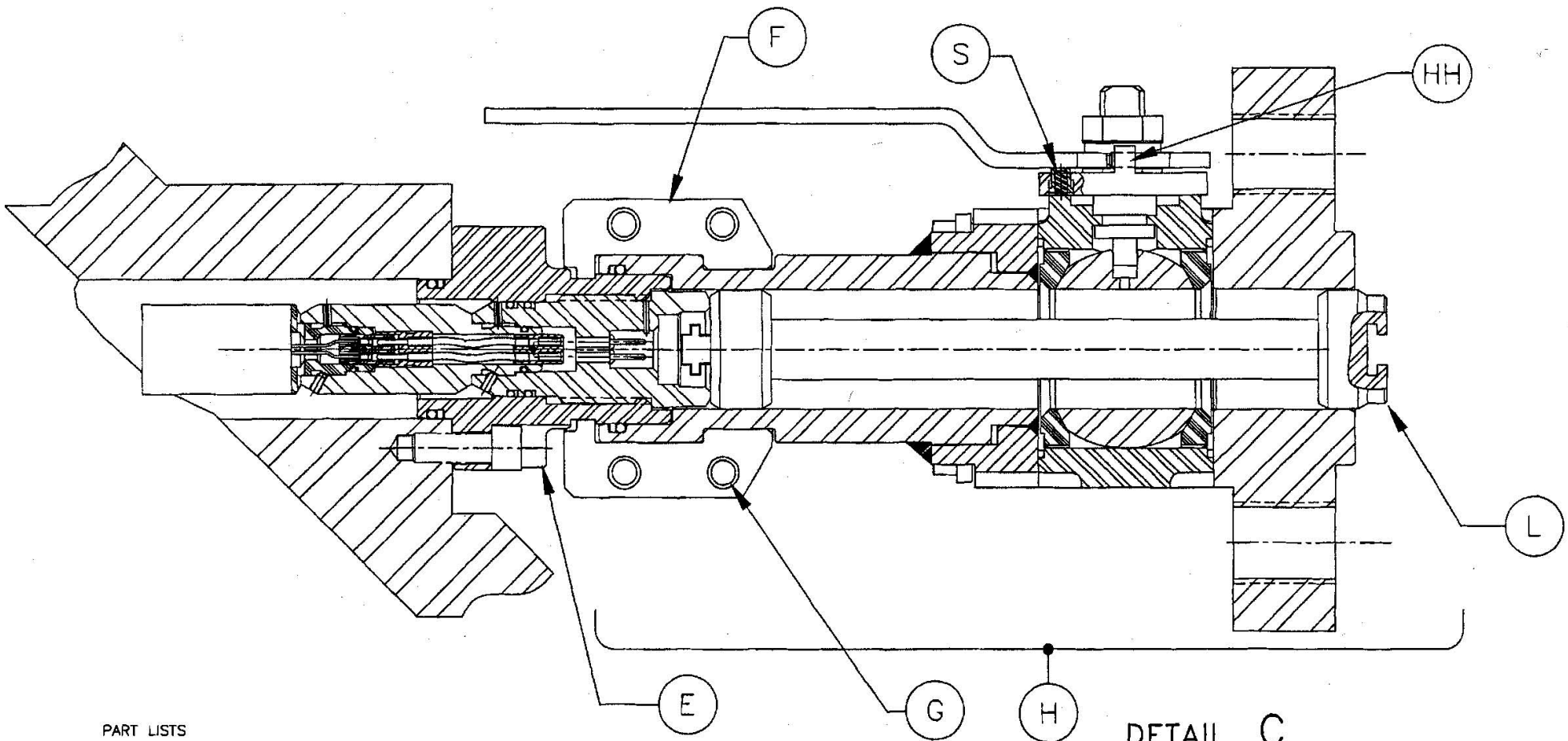

DETAIL C

SCALE: 1/2

PART LISTS

- E TRANSDUCER MOUNT
- F EXTRACTOR TOOL VALVE SPLIT CLAMP
- G SPLIT CLAMP SCREWS
- H EXTRACTOR TOOL VALVE ASSEMBLY
- L EXTENSION
- S VALVE CLOSE STOP BUTTON
- HH VALVE HANDLE STOP PEG SET SCREW

REV	DATE	DRN	DESCRIPTION	CHKD	APPD
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SI METRIC

THIRD ANGLE PROJECTION

MATERIAL

FINISH

PROJ. FILE NO. - NONE

GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

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DANIEL

TITLE: DETAIL "C" OF D-08248

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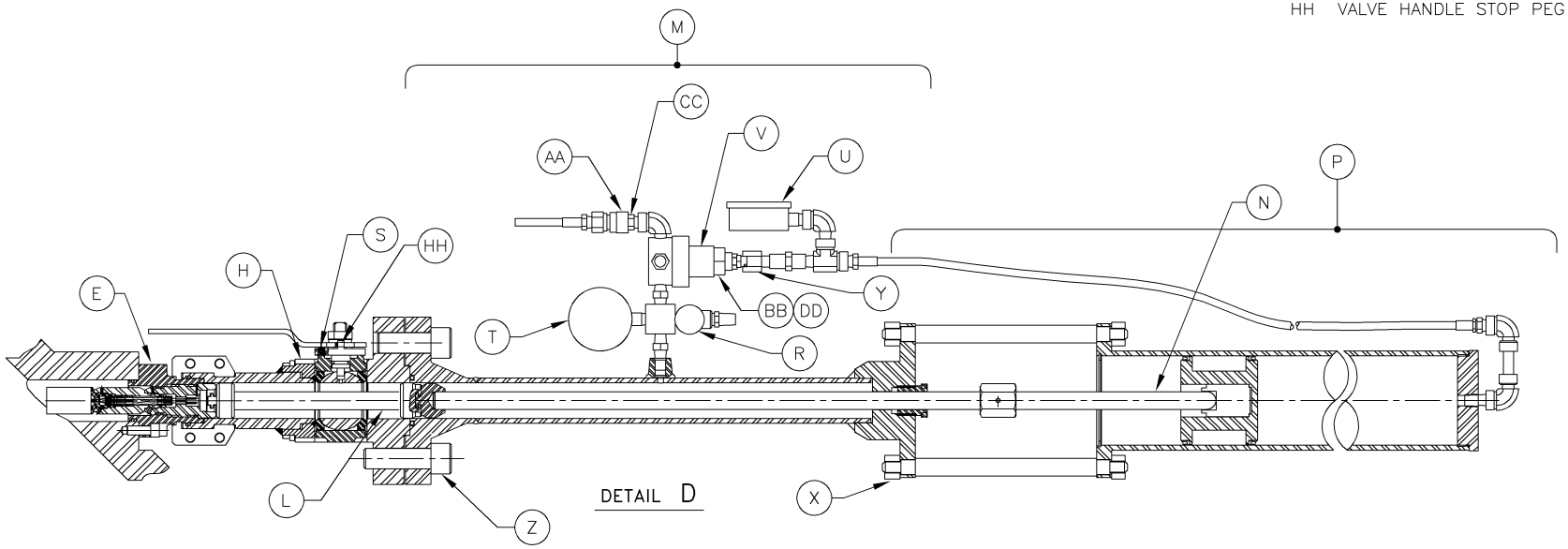
CHKD MAZE	DATE 9-19-02		
APPD CRA	DATE 9-24-02	SCALE 1/2	P/N

SHT 1 OF 1

PART LISTS

E	TRANSDUCER MOUNT
H	EXTRACTOR TOOL VALVE ASSEMBLY
L	EXTENSION
M	LUBRICATOR CHAMBER ASSEMBLY
N	LUBRICATOR CHAMBER EXTRACTOR ROD
P	EXTRACTOR TOOL PISTON ASSEMBLY
R	LUBRICATOR CHAMBER VENT VALVE
S	VALVE CLOSE STOP BUTTON
T	LUBRICATOR CHAMBER PRESSURE GAUGE
U	PISTON PRESSURE GUAGE
V	PRESSURE REGULATOR
X	EXTRACTOR TOOL PISTON ASSEMBLY NUTS
Y	PISTON ORIFICE FITTING
Z	LUBRICATOR CHAMBER CAPSCREWS
AA	HIGH PRESSURE HOSE QUICK CONNECT BODY
BB	LOW PRESSURE HOSE QUICK CONNECT BODY
CC	HIGH PRESSURE HOSE QUICK CONNECT STEM
DD	LOW PRESSURE HOSE QUICK CONNECT STEM
HH	VALVE HANDLE STOP PEG SET SCREW



DETAIL D

REV	DATE	DRN	DESCRIPTION	CHKD	APPD
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A	09-24-02	MOD	RELEASED	MO	CRA

SI METRIC

THIRD ANGLE PROJECTION

MATERIAL

FINISH

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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±0° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

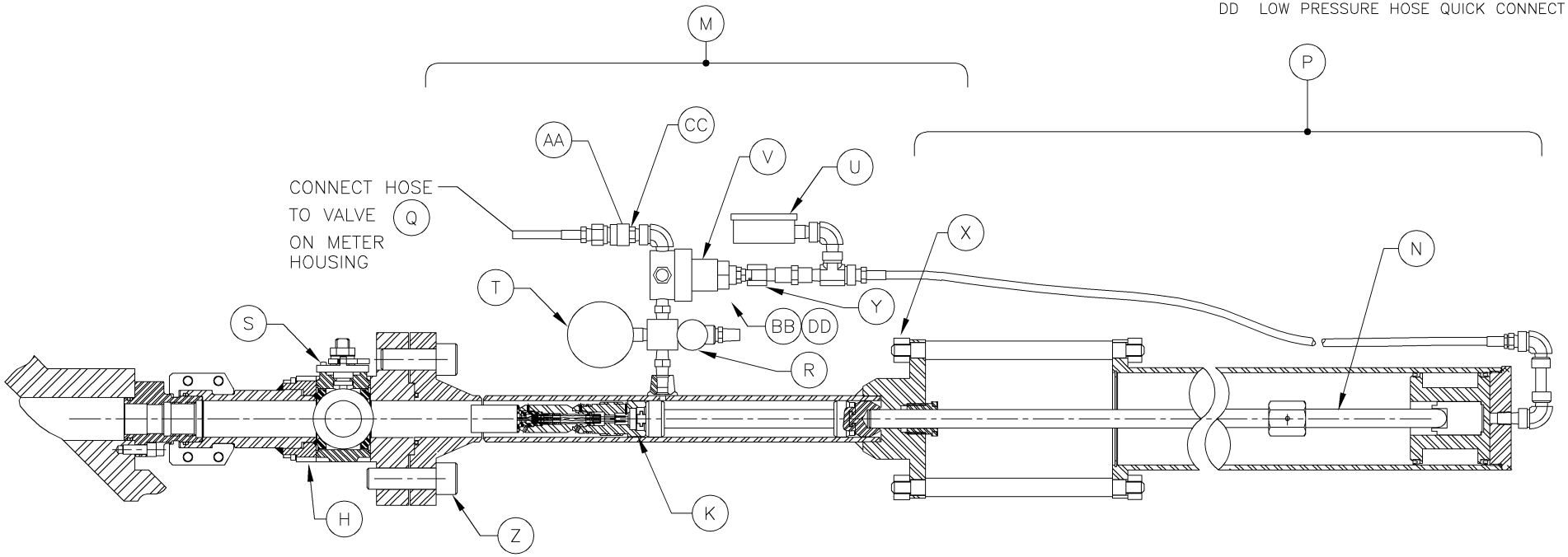
DANIEL MEASUREMENT AND CONTROL DIVISION HOUSTON, TEXAS 77024

TITLE: DETAIL "D" OF D-08248

DRN MOD	DATE 09-18-02	DWG NO. CE-21063	REV B
CHKD MARK	DATE 09-19-02		
APPD CRA	DATE 09-24-02	SCALE 1/2 P/N	SHT 1 OF 1

PART LISTS

H	EXTRACTOR TOOL VALVE ASSEMBLY
K	TRANSDUCER HOLDER
M	LUBRICATOR CHAMBER ASSEMBLY
N	LUBRICATOR CHAMBER EXTRACTOR ROD
P	EXTRACTOR TOOL PISTON ASSEMBLY
Q	ULTRASONIC METER HOUSING LINE PRESSURE VALVE (CUSTOMER SUPPLIED)
R	LUBRICATOR CHAMBER VENT VALVE
S	VALVE CLOSE STOP BUTTON
T	LUBRICATOR CHAMBER PRESSURE GAUGE
U	PISTON PRESSURE GUAGE
V	PRESSURE REGULATOR
X	EXTRACTOR TOOL PISTON ASSEMBLY NUTS
Y	PISTON ORIFICE FITTING
Z	LUBRICATOR CHAMBER CAPSCREWS
AA	HIGH PRESSURE HOSE QUICK CONNECT BODY
BB	LOW PRESSURE HOSE QUICK CONNECT BODY
CC	HIGH PRESSURE HOSE QUICK CONNECT STEM
DD	LOW PRESSURE HOSE QUICK CONNECT STEM



DETAIL E

REV	DATE	DRN	DESCRIPTION	CHKD	APPD
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A	09-24-02	MOD	RELEASED	MO	CRA

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THIRD ANGLE PROJECTION
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FINISH
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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±0° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003–.015 RADIUS AND REMOVE ALL BURRS

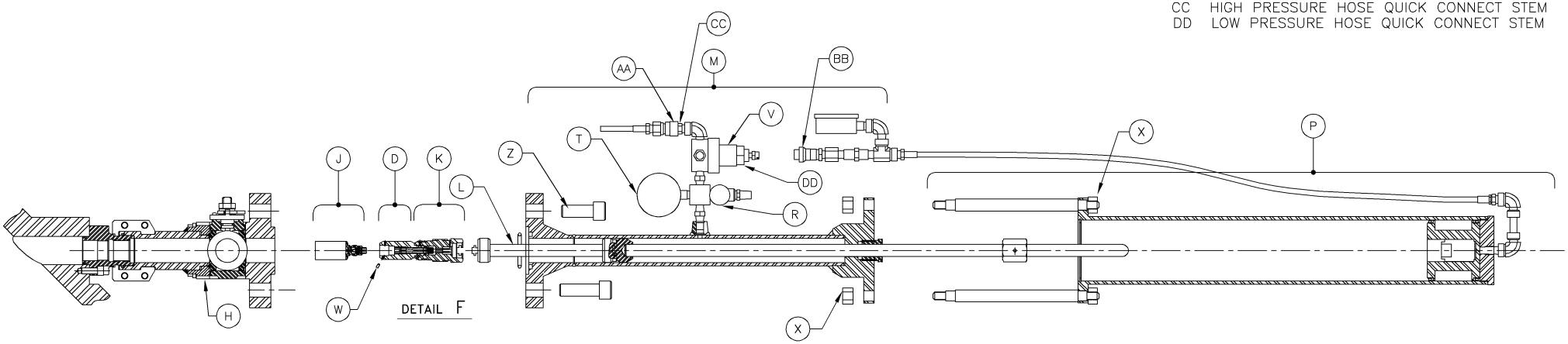
DANIEL MEASUREMENT AND CONTROL DIVISION HOUSTON, TEXAS 77024

TITLE: DETAIL "E" OF D-08248

DRN MOD	DATE 09-18-02	DWG NO. CE-21064	REV B
CHKD MARK	DATE 09-19-02		
APPD CRA	DATE 09-24-02	SCALE 1/2	P/N
			SHT 1 OF 1

PART LISTS

D	TRANSDUCER STALK ASSEMBLY
H	EXTRACTOR TOOL VALVE ASSEMBLY
J	TRANSDUCER ASSEMBLY
K	TRANSDUCER HOLDER
L	EXTENSION
M	LUBRICATOR CHAMBER ASSEMBLY
P	EXTRACTOR TOOL PISTON ASSEMBLY
R	LUBRICATOR CHAMBER VENT VALVE
T	LUBRICATOR CHAMBER PRESSURE GAUGE
V	PRESSURE REGULATOR
W	TRANSDUCER STALK SET SCREWS
X	EXTRACTOR TOOL PISTON ASSEMBLY NUTS
Z	LUBRICATOR CHAMBER CAPSCREWS
AA	HIGH PRESSURE HOSE QUICK CONNECT BODY
BB	LOW PRESSURE HOSE QUICK CONNECT BODY
CC	HIGH PRESSURE HOSE QUICK CONNECT STEM
DD	LOW PRESSURE HOSE QUICK CONNECT STEM



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SI METRIC

THIRD ANGLE PROJECTION

MATERIAL

FINISH

PROJ. FILE NO. – NONE

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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES

X.XX	±.015
X.XXX	±.005
ANGULAR	±0° 30'
FINISH	200 RA MAX

BREAK ALL SHARP CORNERS TO .003–.015 RADIUS AND REMOVE ALL BURRS

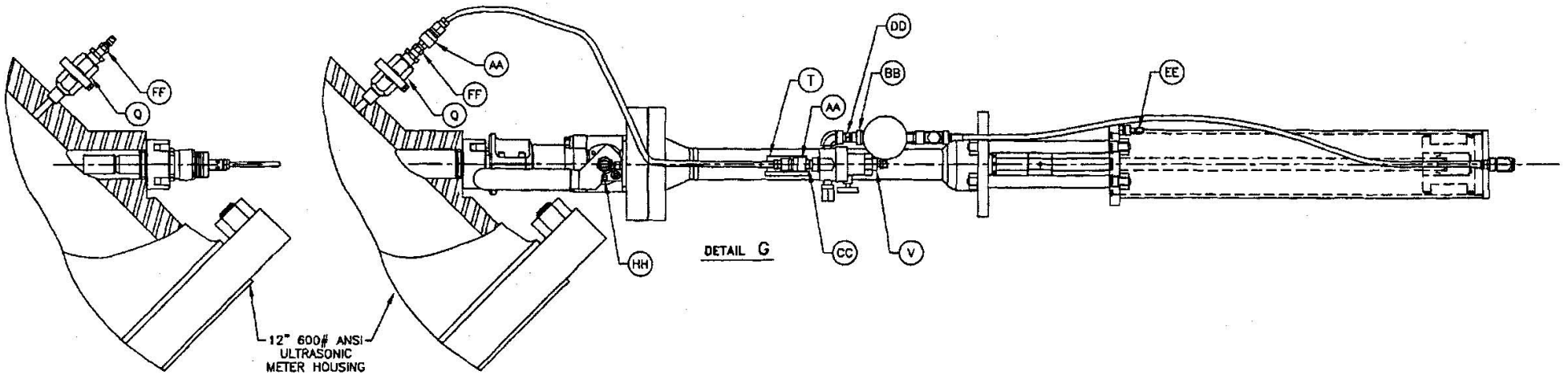
DANIEL MEASUREMENT AND CONTROL DIVISION HOUSTON, TEXAS 77024

TITLE: DETAIL "F" OF D-08248

DRN MOD	DATE 09-18-02	DWG NO. CE-21065	REV B
CHKD MARK	DATE 09-19-02		
APPD CRA	DATE 09-24-02	SCALE NTS P/N	SHT 1 OF 1

PART LISTS

Q	ULTRASONIC METER HOUSING LINE PRESSURE VALVE (CUSTOMER SUPPLIED)
T	LUBRICATOR CHAMBER PRESSURE GAUGE
V	PRESSURE REGULATOR
AA	HIGH PRESSURE HOSE QUICK CONNECT BODY
BB	LOW PRESSURE HOSE QUICK CONNECT BODY
CC	HIGH PRESSURE HOSE QUICK CONNECT STEM
DD	LOW PRESSURE HOSE QUICK CONNECT STEM
EE	LOW PRESSURE HOSE QUICK CONNECT STEM (FOR STORAGE)
FF	METER HOUSING QUICK CONNECT STEM (COMES WITH EXTRACTOR TOOL)
HH	VALVE HANDLE STOP PEG SET SCREW



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GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±2° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003-.015 RADIUS AND REMOVE ALL BURRS

DANIEL MEASUREMENT AND CONTROL HOUSTON, TEXAS 77041

TITLE: DETAIL "G" OF D-08248

DRN MOD	DATE 09-18-02	DWG NO. CE-21066		REV A	
CHKD MARK	DATE 9-19-02				
APPD CRA	DATE 9-24-02	SCALE NTS	P/N	SHT 1 OF 1	

3-9000-744
Revision F
2013

This product is a core component of the PlantWeb digital plant architecture.

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